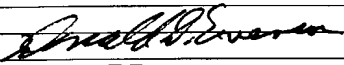


7.

|  |              |                              |            |   |              |
|--|--------------|------------------------------|------------|---|--------------|
| U.S. APPLICATION NO (if known, see 37 CFR 1.5)   |              | INTERNATIONAL APPLICATION NO |            | ATTORNEY'S DOCKET NUMBER  |              |
| <b>10/088741</b>   |              | <b>PCT/EP00/08316</b>        |            | <b>951/50921</b>  |              |
| 17. [X] The following fees are submitted:  |              |                              |            | CALCULATIONS  | PTO USE ONLY |
| Basic National Fee (37 CFR 1.492(a)(1)-(5)):   |              |                              |            |   |              |
| Search Report has been prepared by the EPO or JPO \$ 890.00  |              |                              |            | \$ 890.00   |              |
| International preliminary examination fee paid to USPTO (37 CFR 1.482) \$ 690.00   |              |                              |            |   |              |
| No international preliminary examination fee paid to USPTO (37 CFR 1.482) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$ 740.00  |              |                              |            |   |              |
| Neither international preliminary examination fee (37 CFR 1.482) nor International search fee (37 CFR 1.445(a)(2)) paid to USPTO \$ 1000.00  |              |                              |            |   |              |
| International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) \$ 100.00  |              |                              |            |   |              |
| <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>  |              |                              |            | \$ 890.00   |              |
| Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).   |              |                              |            | \$ 130.00   |              |
| Claims   | Number Filed | Number Extra                 | Rate       |   |              |
| Total Claims   | 24 - 20 =    | 4                            | X \$18.00  | \$ 72.00  |              |
| Independent Claims   | 3 - 3 =      | 3                            | X \$84.00  | \$  |              |
| Multiple dependent claims(s) (if applicable)   |              |                              | + \$280.00 | \$  |              |
| <b>TOTAL OF ABOVE CALCULATIONS=</b>  |              |                              |            | \$1,092.00  |              |
| Applicant claims Small Entity Status (See 37 CFR §1.27) <input type="checkbox"/> yes <input checked="" type="checkbox"/> no. Reduction by 1/2 for filing by small entity, if applicable.   |              |                              |            | \$  |              |
| <b>SUBTOTAL =</b>  |              |                              |            | \$1,092.00  |              |
| Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).  |              |                              |            | \$  |              |
| <b>TOTAL NATIONAL FEE =</b>  |              |                              |            | \$1,092.00  |              |
| Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28,3.31). \$40.00 per property +  |              |                              |            | \$  |              |
| <b>TOTAL FEE ENCLOSED =</b>  |              |                              |            | \$1,092.00  |              |
|  |              |                              |            | Amount to be: refunded \$   |              |
|  |              |                              |            | Charged \$  |              |
| a. <input checked="" type="checkbox"/> A check in the amount of \$1,092.00 for the filing fee is enclosed  |              |                              |            |   |              |
| b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.  |              |                              |            |   |              |
| c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees, which may be required, or credit any overpayment to Deposit Account No. 05-1323 (Attorney Docket # 951/50921). A duplicate copy of this sheet is enclosed. |              |                              |            |   |              |
| NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.  |              |                              |            |   |              |
| SEND ALL CORRESPONDENCE TO:  |              |                              |            |  |              |
| Crowell & Moring, LLP  |              |                              |            | SIGNATURE   |              |
| Intellectual Property Group  |              |                              |            | Donald D. Evenson   |              |
| P.O. Box 14300   |              |                              |            | NAME  |              |
| Washington, D.C. 20044-4300  |              |                              |            | 26,160  |              |
| Tel. No. (202) 624-2500  |              |                              |            | REGISTRATION NUMBER   |              |
| Fax No. (202) 628-8844   |              |                              |            | March 22, 2002  |              |
|  |              |                              |            | DATE  |              |

DDE:SZ:tlm (CAM # 80437 790)

## APPLICATION DATA SHEET

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Postal or Zip Code: D-70563  
City of residence: Stuttgart  
Country of residence: Federal Republic of Germany  
Citizenship Country: Federal Republic of Germany

$$\begin{aligned} & \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 0 \\ & \frac{\partial^2 f}{\partial x^2} + \frac{\partial^2 f}{\partial y^2} = 0 \end{aligned}$$

Title line one: DISPLAY DEVICE AND METHOD  
Total drawing sheets: 2  
Formal drawings: Yes  
Application type: Utility  
Docket Number: 951/50921

Representative customer number: 23911

## CONTINUITY INFORMATION

This application is a: national stage of  
Application one: PCT/EP00/08316  
Filing date: 26 August 2000

|                          |                             |
|--------------------------|-----------------------------|
| Foreign application one: | 199 46 012.4                |
| Filing date:             | 25 September 1999           |
| Country:                 | Federal Republic of Germany |
| Priority claimed:        | Yes                         |

- 2 -

Attorney Docket: 951/50921  
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: HERMANN KUENZNER ET AL  
Serial No.: TO BE ASSIGNED PCT NO.: PCT/EP00/08316  
Filed: March 22, 2002  
Title: DISPLAY DEVICE AND METHOD

PRELIMINARY AMENDMENT

Box Non-Fee Amendment  
Commissioner for Patents  
Washington, D.C. 20231

Sir:

Please enter the following amendments to the specification, claims and abstract prior to the examination of the application.

IN THE SPECIFICATION:

A substitute specification and a marked-up copy thereof is attached herewith.

IN THE CLAIMS:

Please amend Claims 1-9 as follows (**a marked-up version of the amended claims is attached hereto**):

1. (Amended) A display device having a display unit, comprising a scale with graphic information and an indicator element which is aligned as a function of at least one input parameter with a position of the scale, wherein a

display of the graphic information in an area around a momentary position of the indicator element is emphasized in comparison with a normal display.

2. (Amended) The display device according to Claim 1, wherein the area is selected as a function of the input parameter.

3. (Amended) The display device according to Claim 1, wherein the display of the graphic information within this area is selected in a pre-determined manner.

4. (Amended) The display device according to Claim 3, wherein the change is defined by at least one of an enlargement, a different contrast, a different color and a shift.

5. (Amended) The display device according to Claim 2, wherein a control device is provided which receives the input parameter and is connected with the display unit.

6. (Amended) The display device according to Claim 1, wherein a video screen display is used as the display unit.

7. (Amended) The display device according to claim 1, wherein the display unit is configured as a round instrument.

8. (Amended) The display device according to Claim 1, wherein the graphic information is at least one of letter and number information.

9. (Amended) The display device according to Claim 1, wherein the display unit includes a speedometer of a vehicle.

Please add the following new claims:

10. (New) A display device comprising:  
  
a scale having graphic information; and  
  
an indicator element, the position of the indicator element relative to the scale being a function of a parameter to be displayed, wherein the graphic information in an area around the position of the indicator element is emphasized.
11. (New) The display device according to Claim 10,  
  
wherein a characteristic of the area varies with a characteristic of the parameter.
12. (New) The display device according to Claim 11,  
  
wherein the size of the area varies with the rate of change of the parameter.
13. (New) The display device according to Claim 11,  
  
wherein the location of the area varies with the rate of change of the parameter.
14. (New) The display device according to Claim 10,  
  
wherein the graphic information in the area is enlarged.
15. (New) The display device according to Claim 10,  
  
wherein the graphic information in the area is emphasized by a different contrast.

16. (New) The display device according to Claim 10,  
wherein the graphic information in the area is emphasized by a  
different color.

17. (New) The display device according to Claim 10,  
wherein the graphic information includes at least one of letter and  
number information.

18. (New) A method of displaying a parameter on a display device  
including a scale with graphic information, and an indicator element, the  
position of the indicator element relative to the scale being a function of a  
parameter, the method comprising:

emphasizing the graphic information in an area around the position  
of the indicator element.

19. (New) The method according to Claim 18, comprising:  
varying a characteristic of the area with a characteristic of the  
parameter.

20. (New) The method according to Claim 19,  
wherein the step of varying the characteristic of the area includes  
varying the size of the area with the rate of change of the parameter.

21. (New) The method according to Claim 19,  
wherein the step of varying the characteristic of the area includes  
varying the location of the area with the rate of change of the parameter.



22. (New) The method according to Claim 18,

wherein the step of emphasizing the graphic information includes enlarging the graphic information in the area.

23. (New) The method according to Claim 18,

wherein the step of emphasizing the graphic information includes emphasizing the graphic information by a different contrast.

24. (New) The method according to Claim 18,

wherein the step of emphasizing the graphic information includes emphasizing the graphic information by a different color.

**IN THE ABSTRACT:**

Please substitute the new Abstract of the Disclosure submitted herewith on a separate page for the original Abstract presently in the application.

(Applicant's Remarks are set forth hereinbelow, starting on the following page.)

PCT NO.: PCT/EP00/08316  
Attorney Docket: 951/50921

**REMARKS**

Entry of the amendments to the specification, claims and abstract before examination of the application is respectfully requested.

If there are any questions regarding this Preliminary Amendment or this application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

Respectfully submitted,

March 22, 2002



Donald D. Evenson  
Registration No. 26,160  
Song Zhu  
Registration No. 44,420

CROWELL & MORING, LLP  
Intellectual Property Group  
P.O. Box 14300  
Washington, DC 20044-4300  
Telephone No.: (202) 624-2500  
Facsimile No.: (202) 628-8844  
DDE:SZ:tlm  
(CAM #: 80437.790)

**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

Claims 1-9 have been amended as follows:

1. (Amended) [Display] A display device having a display unit [(10)], [which comprises] comprising a scale with graphic information [(11)] and an indicator element [(13)] which [can be] is aligned as a function of at least one input parameter with a position of the scale [(11)], [characterized in that the] wherein a display of the graphic information in an area [(B)] around [the] a momentary position of the indicator element [(13)] is emphasized in comparison [to the] with a normal display.

2. (Amended) [Display] The display device according to Claim 1, [characterized in that] wherein the area [(B)] can be] is selected as a function of the input parameter [information (n, v)].

3. (Amended) [Display] The display device according to Claim 1 [or 2], [characterized in that] wherein the display of the graphic information within this area [(B)] can be] is selected in a [defined] pre-determined manner.

4. (Amended) [Display] The display device according to [one of the preceding claims] Claim 3, [characterized in that] wherein the change is defined by at least one of an enlargement, a different contrast, a different color and[/or] a shift.

5. (Amended) [Display] The display device according to [one of the preceding claims] Claim 2, [characterized in that] wherein a control device [(12)]

is provided which receives the input parameter [parameters (v, n)] and is connected with the display unit [(10)].

6. (Amended) [Display] The display device according to [one of the preceding claims] Claim 1, [characterized in that] wherein a video screen display is used as the display unit [(10)].

7. (Amended) [Display] The display device according to [one of the preceding claims] claim 1, [characterized in that] wherein the display unit [(10)] is [constructed in the shape of] configured as a round instrument.

8. (Amended) [Display] The display device according to [one of the preceding claims] Claim 1, [characterized in that] wherein the graphic information is at least one of [information is] letter and[/or] number information.

9. (Amended) [Display] The display device according to [one of the preceding claims] Claim 1, [characterized in that] wherein the display unit [(10)] is] includes a speedometer of a vehicle.

Attorney Docket: 951/50921  
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: HERMANN KUENZNER ET AL  
Serial No.: TO BE ASSIGNED PCT NO.: PCT/EP00/08316  
Filed: March 22, 2002  
Title: DISPLAY DEVICE AND METHOD

SUBMISSION OF SUBSTITUTE SPECIFICATION

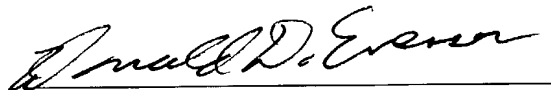
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Attached is a Substitute Specification and a marked-up copy of the original specification. I certify that said substitute specification contains no new matter and includes the changes indicated in the marked-up copy of the original specification.

Respectfully submitted,

March 22, 2002



Donald D. Evenson  
Registration No. 26,160  
Song Zhu  
Registration No. 44,420

CROWELL & MORING, LLP  
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P.O. Box 14300  
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Facsimile No.: (202) 628-8844  
DDE:SZ:tlm  
(CAM #: 80437.790)

Substitute Specification – PCT/EP00/08316  
Attorney Docket No. 951/50921

## DISPLAY DEVICE AND METHOD

### BACKGROUND AND SUMMARY OF THE INVENTION

The invention relates to a display device and a display method.

Display devices with scales, which graphically display information, are used in all fields of technology and inform people of many different conditions of machines and equipment and about many different circumstances. A very narrow application involves the vehicle, where vehicle operating conditions are provided to the vehicle operator by display devices. Although it will be described relative to this field, the present invention should not be so limited.

How much space for the transmission of information is available depending on the local situations and the extent of the display. In the case of vehicles, for example, an increasing number of scale marks must be shown in the area of speedometer readings as a result of higher maximum speeds. Furthermore, the available space is increasingly reduced because of additional display devices, such as the rotational speed, the tank, the navigation devices, etc. On the whole, the display units are therefore becoming smaller and are consequently more difficult to read. For older far-sighted persons or with a quick glance, the displayed information may be difficult to recognize. Similar problems also occur in other areas where generally little space is available for display instruments.

It is an object of the invention to further develop a display device of the above-mentioned type where the information displayed can be absorbed rapidly and reliably.

A core idea of the invention is to change and emphasize the representation of the graphic information in an area where the actual position of the indicator element is. The type of the changes can be freely selected. In particular, it is possible to enlarge the graphic information, to show it with a higher contrast, to indicate it in a different color or to displace it.

For example, normal indicator needles or graphic indicators (such as marks in the scale) can be used as the indicator element.

As a result of the emphasis, a viewer is automatically directed to the area of the scale where the indicator element is situated. As a result, he can rapidly and reliably recognize the information supplied by the indicator element.

In a particularly preferred embodiment of the invention, the emphasized area is selected as a function of input information. In particular, the size and position of the area can be changed. By changing the area, additional information can be transmitted, for example, information concerning due movements of the indicator element.

In addition, or as an alternative, to the change of the area, the display of the graphic information in the area itself can also be changed. These changes may be predefined or be made a function of parameters. If the emphasizing is generated by enlargements of the graphic information, a decrease of the enlargement, for example, can take place with an increasing distance from the

indicator element. As an alternative, a change of color or position depending on the distance of the indicator element is also possible.

A particularly advantageous embodiment can be implemented by a video screen display as an indicator unit. On the display, the graphic information can be changed in a simple manner. In contrast to a normal instrument dial indication, it is possible in a simple manner for a video screen display to show numbers or letters in an enlarged fashion, in color or displaced. The display unit, particularly the video screen display, is preferably controlled by a control device. The required parameters are fed to the control device, are processed by it and are transmitted in a processed form to the display unit.

A useful application of the invention is in the area of a vehicle instrument. For example, the speedometer can be constructed in the manner described above.

The invention will be described in the following with respect to a speedometer and with respect to the attached drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a simple schematic diagram of an embodiment of the invention;

Figure 2 is a representation of a speedometer whose scale is enlarged according to the invention around the indicator element; and

Figures 3a and 3b, as well as Figures 4a and 4b, are representations as shown in Figure 2 where the areas in which the enlargements take place are changed.



## DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic view of a video screen display 10 which is connected with a control device 12. The control device 12 receives input information, such as vehicle speed  $v$  and rotational engine speed  $n$ .

On the video screen display 10, an indicator 13 is shown which indicates the vehicle speed  $v$  on a scale 11 (not shown in Figure 1). In addition to scaling lines, the scale 11 has number presentations which explicitly indicate the speed in km/h. Using the scaling and the numbers on the video screen display 10, the information can be displayed in different sizes and positions.

Conventionally, all information over the entire scale is indicated in a uniform size.

According to the invention, as shown in Figure 2, an area B is defined around the actual position of the indicator 13, in which the numbers are shown in an enlarged manner (compare Figure 2). The size of the enlargement depends on the distance of the respective number from the momentary indicator position. According to Figure 2, number 80 is shown to be the largest and number 60 is the second largest. All other numbers have the normal size. The area B is determined by the control device 12 on the basis of the input parameters  $v$  and  $n$  and is placed symmetrically around the actual indicator position.

Naturally, the emphasizing on the video screen display can also be implemented by shifts of the information, color changes or a higher contrast.

As a result of the emphasis, a driver, when briefly looking at the speedometer, is automatically directed to the enlarged area so that he can easily

and rapidly detect the speed information specified more precisely by the indicator 13.

Figures 3a, 3b, 4a and 4b illustrate how additional information can be transmitted by the selection of the area of emphasis.

In the case of acceleration, the area is shifted toward the higher speeds, as shown in Figure 3a, so that the speeds are emphasized in an area toward which the indicator 13 is moving. In the embodiment according to Figure 3a, the area B starts at the indicator 13 and is oriented toward the higher speeds.

Analogously, during braking operations, the area B is shifted toward lower speeds, as shown in Figure 3b. In this case, the size of the enlargement is again dependent on the distance of the number information from the actual indicator position. On the whole, in the embodiments shown in Fig 3a and 3b, the area is shifted around the actual indicator position depending on the driving dynamics.

However, it is not only the location of the area B that can be changed. The extent or dimension of the area B can also be adjusted. In Figures 4a and 4b, the size of the area of emphasis depends on the extent of the acceleration. In the case of higher acceleration (Figure 4a), the emphasized area B is larger than in the case of less acceleration (Figure 4b).

To this extent, an area of emphasis around the actual indicator position looks ahead toward a future driving speed, so that an acknowledgment can be made concerning the extent of the speed change. This acknowledgment is particularly clear when scale lines are used in addition to the numbers for indicating the prediction (see, for example, Figures 3a and 4b).

On the whole, in the case of the above-mentioned embodiments, also when a display surface is small, important information can be displayed such that it can be absorbed at a brief glance. This is of special interest also for persons who do not have perfect vision.

The present invention can be used wherever a simple and rapid information transmission is important in the case of a display device. In this respect, the invention is not limited to the present embodiment.

# DISPLAY DEVICE AND METHOD

## BACKGROUND AND SUMMARY OF THE INVENTION

The invention relates to a display device [according to the preamble of Claim 1] and a display method.

Display devices with scales, which graphically display information, are used in all fields of technology and inform people of many different conditions of machines and equipment and about many different circumstances. A very narrow application [range] involves the vehicle [field], where vehicle operating conditions are provided to the vehicle operator by [means of] display devices. Although [the present invention] it will be described relative to this field, [this description] the present invention should not be so limited [limiting].

[More or less] How much space for the transmission of information is available depending on the local situations and the extent of the display. In the case of vehicles, for example, an increasing number of scale marks must be shown in the area of speedometer readings as a result of higher [maximal] maximum speeds. Furthermore, the available space is increasingly reduced because of additional display devices, such as the rotational speed, the tank, the navigation devices, etc. On the whole, the display units are therefore becoming smaller and are consequently more difficult to read. [In the case of] For older far-sighted persons or [at a short] with a quick glance, [problems arise with respect to the recognition] the displayed information may be difficult to

recognize. Similar problems also occur in other areas where generally little space is available for display instruments.

It is an object of the invention to further develop a display device of the [initially] above-mentioned type [in that] where the information displayed [thereby] can be absorbed rapidly and reliably.

[This object is achieved by means of the characteristics indicated in Claim 1].

A core idea of the invention is to change and emphasize the representation of the graphic information in an area [in order to change and emphasize] where the actual position of the indicator element is [with respect to the normal representation]. The type of the changes can be freely selected. In particular, it is possible to enlarge the graphic information, to [image] show it with a higher contrast, to indicate it in a different color or to displace it.

For example, normal indicator needles or graphic indicators[,] (such as marks in the scale) can be used as the indicator element.

As a result of the emphasis, a viewer is automatically directed to the area of the scale [in which] where the indicator element is situated. As a result, he can [particularly] rapidly and reliably recognize the information supplied by the indicator element.

[A] In a particularly preferred embodiment of the invention, [is characterized in that] the emphasized area [in which the emphasizing takes place] is selected as a function of input information. In particular, the size and position of the area can be changed. By changing the area, additional

information can be transmitted, for example, information concerning due movements of the indicator element.

In addition, or as an alternative, to the change of the area, the display of the graphic information in the area itself can also be changed. These changes may be predefined or be made a function of parameters. If the emphasizing is generated by enlargements of the graphic information, a decrease of the enlargement, for example, can take place with an increasing distance from the indicator element. As an alternative, a change of color or position depending on the distance of the indicator element is also possible.

A particularly advantageous embodiment can be implemented by [means of] a video screen display as an indicator unit. On the display, the graphic information can be changed in a simple manner. In contrast to a normal instrument dial indication, [in the case of a display], it is possible in a simple manner for a video screen display to show numbers or letters in an enlarged fashion, in color or displaced. The display unit, particularly the video screen display, is preferably controlled by a control device. The required parameters are fed to the control device, are processed by it and are transmitted in a processed form to the display unit.

A useful [method of] application of the invention [exists in the case] is in the area of a vehicle instrument. For example, the speedometer can be constructed in the manner described above.

The invention will be described in the following with respect to a speedometer and with respect to the attached drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a simple schematic diagram of an embodiment of the invention[.];

Figure 2 is a representation of a speedometer whose scale is enlarged according to the invention around the indicator element; and

Figures 3a and 3b, as well as Figures 4a and 4b, are representations as shown in Figure 2[, in which case] where the areas in which the enlargements take place are changed.

## DETAILED DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic view of a video screen display 10 which is connected with a control device 12. The control device 12 receives input information, [specifically in the present case, the] such as vehicle speed  $v$  and [the] rotational engine speed  $n$ .

On the video screen display 10, an indicator 13 is shown which indicates the vehicle speed  $v$  on a scale 11 (not shown in Figure 1). In addition to scaling lines, the scale 11 has number presentations which explicitly indicate the speed in km/h. [By generating] Using the scaling and the numbers on the video screen display 10, the information can be [selected] displayed in [all] different sizes and positions.

Conventionally, all information over the entire scale is indicated in a uniform size.

[In a manner according] According to the invention, as shown [indicated] in Figure 2, an area B is defined around the actual position of the indicator 13, in which the numbers are shown in an enlarged manner (compare Figure 2). [In this case, the] The size of the enlargement depends on the distance of the respective number [information] from the momentary indicator position. According to Figure 2, number 80 is shown to be the largest and number 60 is the second largest. All other numbers have the normal size. [Area] The area B is determined [in] by the control device 12 on the basis of the input parameters v and n and is [distributed] placed symmetrically around the actual indicator position.

Naturally, the emphasizing on the video screen display can also be implemented by shifts of the information, color changes or a higher contrast.

As a result of the emphasis, a driver['s glance], when briefly looking at the speedometer, is automatically directed to the enlarged area so that he can easily and rapidly detect the speed information specified more precisely by the indicator

13.

[By means of] Figures 3a, 3b, 4a and 4b[, it is illustrated] illustrate how additional information can be transmitted by the selection of the area of [the] emphasis.

In the case of acceleration[s], the area is shifted toward the higher speeds, as shown in Figure 3a [(compare Figure 3a)], so that the speeds are emphasized in an area toward which the indicator 13 is moving. In the embodiment



according to Figure 3a, the area B starts at the indicator 13 and is oriented toward the higher speeds.

Analogously, during braking operations, the area B is shifted toward lower speeds, as shown in Figure 3b [(compare Figure 3b)]. In this case, the size of the enlargement is again dependent on the distance of the number information from the actual indicator position. On the whole, in the embodiments [according to] shown in Fig 3a and 3b, the area is shifted [from its position round] around the actual indicator position depending on the driving dynamics.

However, it is not only the location of the area B that can be changed. The extent or dimension of the area B can also be adjusted. In Figures 4a and 4b, [a representation is selected, in the case of which] the size of the area of [the] emphasis depends on the extent of the acceleration. In the case of higher acceleration[s] (Figure 4a), [an emphasizing is carried out in a larger] the emphasized area B is larger than in the case of [a] less [high] acceleration ([compare] Figure 4b).

To this extent, an area of emphasis [shifted] around the actual indicator position [is a looking] looks ahead toward a future driving speed, so that an acknowledgment can be made concerning the extent of the speed change. This acknowledgment is particularly clear when scale lines are used in addition to the numbers for indicating the prediction ([compare,] see, for example, Figures 3a and 4b).

On the whole, in the case of the above-mentioned embodiments, also when a display surface is small, important information [to be indicated] can be

displayed such that it can be absorbed [also] at a brief glance. This is of special interest also for persons who do not have perfect vision.

The present invention can be used wherever a simple and rapid information transmission is important in the case of a display device. In this respect, the invention is not limited to the present embodiment.

## ABSTRACT OF THE DISCLOSURE

A display device includes having a display unit which comprises a scale with graphic information and an indicator element which can be aligned as a function of at least one input parameter with a position of the scale. In order to ensure a better readability particularly in the case of small display devices, the display of the graphic information is changed in an area around the momentary position of the indicator element in comparison to a normal display.

DISPLAY DEVICE

The invention relates to a display device according to the preamble of Claim 1.

Display devices with scales, which graphically display information, are used in all fields of technology and inform people of many different conditions of machines and equipment and about many different circumstances. A very narrow application range involves the vehicle field, where vehicle operating conditions are provided to the vehicle operator by means of display devices. Although the present invention will be described relative to this field, this description should not be limiting.

More or less space for the transmission of information is available depending on local situations and the extent of the display. In the case of vehicles, for example, an increasing number of scale marks must be shown in the area of speedometer readings as a result of higher maximal speeds. Furthermore, the available space is increasingly reduced because of additional display devices, such as the rotational speed, the tank, the navigation devices, etc. On the whole, the display units are therefore becoming smaller and are consequently more difficult to read. In the case of older far-sighted persons or at a short

glance, problems arise with respect to the recognition. Similar problems also occur in other areas where generally little space is available for display instruments.

It is an object of the invention to further develop a display device of the initially mentioned type in that the information displayed thereby can be absorbed rapidly and reliably.

This object is achieved by means of the characteristics indicated in Claim 1.

A core idea of the invention is the representation of the graphic information in an area in order to change and emphasize the actual position of the indicator element with respect to the normal representation. The type of the changes can be freely selected. In particular, it is possible to enlarge the graphic information, to image it with a higher contrast, to indicate it in a different color or to displace it.

For example, normal indicator needles or graphic indicators, (such as marks in the scale) can be used as the indicator element.

As a result of the emphasis, a viewer is automatically

directed to the area of the scale in which the indicator element is situated. As a result, he can particularly rapidly and reliably recognize the information supplied by the indicator element.

A particularly preferred embodiment of the invention is characterized in that the area in which the emphasizing takes place is selected as a function of input information. In particular, the size and position of the area can be changed. By changing the area, additional information can be transmitted, for example, information concerning due movements of the indicator element.

In addition or as an alternative to the change of the area, the display of the graphic information in the area itself can also be changed. These changes may be predefined or be made a function of parameters. If the emphasizing is generated by enlargements of the graphic information, a decrease of the enlargement, for example, can take place with an increasing distance from the indicator element. As an alternative, a change of color or position depending on the distance of the indicator element is also possible.

A particularly advantageous embodiment can be implemented by means of a video screen display as an indicator unit. On the

display, the graphic information can be changed in a simple manner. In contrast to a normal instrument dial indication, in the case of a display, it is possible in a simple manner to show numbers or letters in an enlarged fashion, in color or displaced.

The display unit, particularly the video screen display, is preferably controlled by a control device. The required parameters are fed to the control device, are processed by it and are transmitted in a processed form to the display unit.

A useful method of application of the invention exists in the case of a vehicle instrument. For example, the speedometer can be constructed in the manner described above.

The invention will be described in the following with respect to a speedometer and with respect to the attached drawings.

Figure 1 is a simple schematic diagram of an embodiment of the invention.

Figure 2 is a representation of a speedometer whose scale is enlarged according to the invention around the indicator element;

Figures 3a and 3b as well as

Figures 4a and 4b are representations as in Figure 2, in

which case the areas in which the enlargements take place are changed.

Figure 1 is a schematic view of a video screen display 10 which is connected with a control device 12. The control device 12 receives input information, specifically in the present case, the vehicle speed  $v$  and the rotational engine speed  $n$ .

On the video screen display 10, an indicator 13 is shown which indicates the vehicle speed  $v$  on a scale 11 (not shown in Figure 1). In addition to scaling lines, the scale 11 has number presentations which explicitly indicate the speed in km/h. By generating the scaling and the numbers on the video screen display 10, the information can be selected in all different sizes and positions.

Conventionally, all information over the entire scale is indicated in a uniform size.

In a manner according to the invention indicated in Figure 2, an area B is defined around the actual position of the indicator 13, in which the numbers are shown in an enlarged manner (compare Figure 2). In this case, the size of the enlargement depends on the distance of the respective number information from the momentary indicator position. According to



Figure 2, number 80 is shown to be the largest and number 60 is the second largest. All other numbers have the normal size. Area B is determined in the control device 12 on the basis of the input parameters  $v$  and  $n$  and is distributed symmetrically around the actual indicator position.

Naturally, the emphasizing on the video screen display can also be implemented by shifts of the information, color changes or a higher contrast.

As a result of the emphasis, a driver's glance, when briefly looking at the speedometer, is automatically directed to the enlarged area so that he can easily and rapidly detect the speed information specified more precisely by the indicator 13.

By means of Figures 3a, 3b, 4a and 4b, it is illustrated how additional information can be transmitted by the selection of the area of the emphasis.

In the case of accelerations, the area is shifted toward the higher speeds (compare Figure 3a), so that the speeds are emphasized in an area toward which the indicator 13 is moving. In the embodiment according to Figure 3a, the area B starts at the indicator 13 and is oriented toward the higher speeds.

Analogously, during braking operations, the area B is shifted toward lower speeds (compare Figure 3b). In this case, the size of the enlargement is again dependent on the distance of the number information from the actual indicator position. On the whole, in the embodiments according to Fig 3a and 3b, the area is shifted from its position round the actual indicator position depending on the driving dynamics.

However, it is not only the location of the area that can be changed. The extent or dimension of the area B can also be adjusted. In Figures 4a and 4b, a representation is selected, in the case of which size of the area of the emphasis depends on the extent of the acceleration. In the case of higher accelerations (Figure 4a), an emphasizing is carried out in a larger area B than in the case of a less high acceleration (compare Figure 4b).

To this extent, an area of emphasis shifted around the actual indicator position is a looking ahead toward a future driving speed, so that an acknowledgment can be made concerning the extent of the speed change. This acknowledgment is particularly clear when scale lines are used in addition to the numbers for indicating the prediction (compare, for example, Figures 3a and 4b).

On the whole, in the case of the above-mentioned embodiment,



characterized in that the display of the graphic information within this area (B) can be selected in a defined manner.

4. Display device according to one of the preceding claims, characterized in that the change is defined by an enlargement, a different contrast, a different color and/or a shift.

5. Display device according to one of the preceding claims, characterized in that a control device (12) is provided which receives the input parameters (v, n) and is connected with the display unit (10).

6. Display device according to one of the preceding claims, characterized in that a video screen display is used as the display unit (10).

7. Display device according to one of the preceding claims, characterized in that the display unit (10) is constructed in the shape of a round instrument.

8. Display device according to one of the preceding claims, characterized in that the graphic information is letter and/or number information.

9. Display device according to one of the preceding claims,

characterized in that the display unit (10) is a speedometer of a vehicle.

## Display Device

### ABSTRACT:

The invention relates to a display device having a display unit which comprises a scale with graphic information and an indicator element which can be aligned as a function of at least one input parameter with a position of the scale.

In order to ensure a better readability particularly in the case of small display devices, it is suggested to change the display of the graphic information in an area around the momentary position of the indicator element in comparison to a normal display.

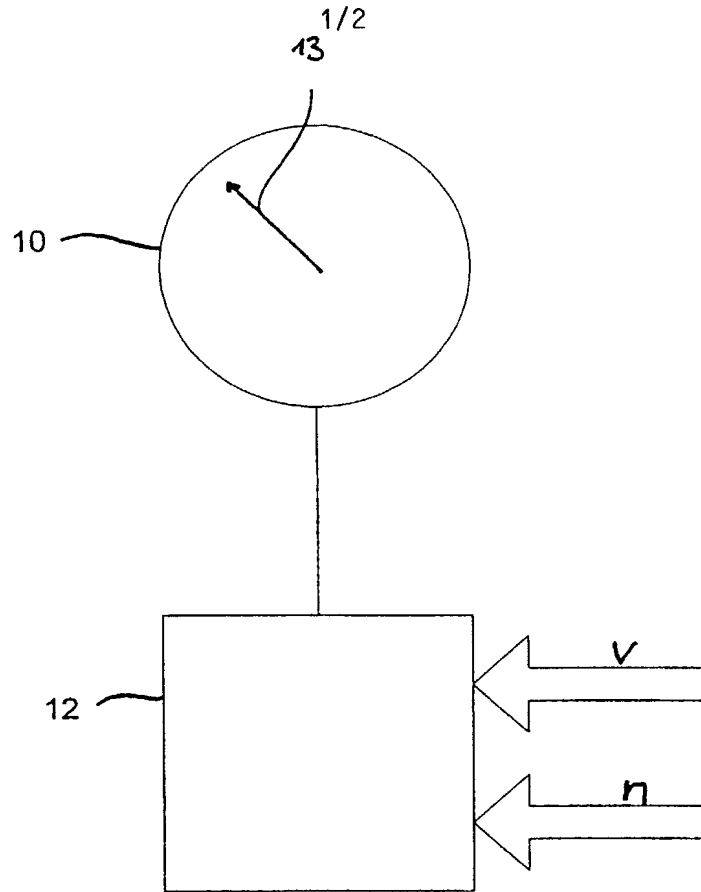


Fig. 1

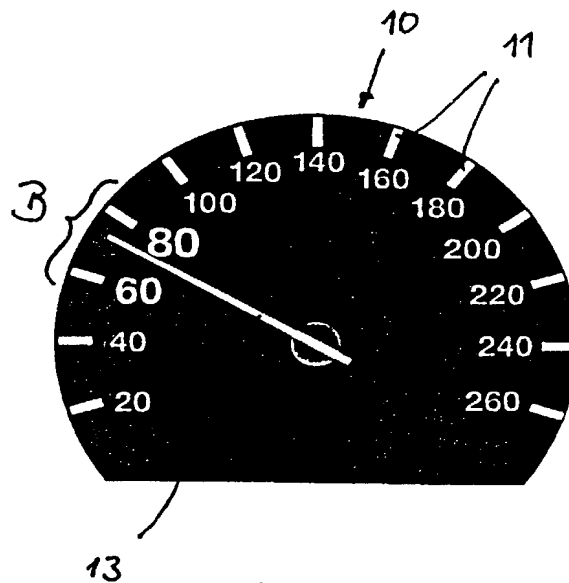
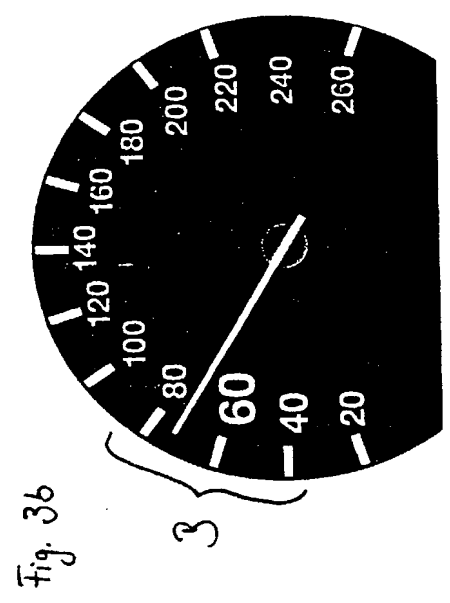
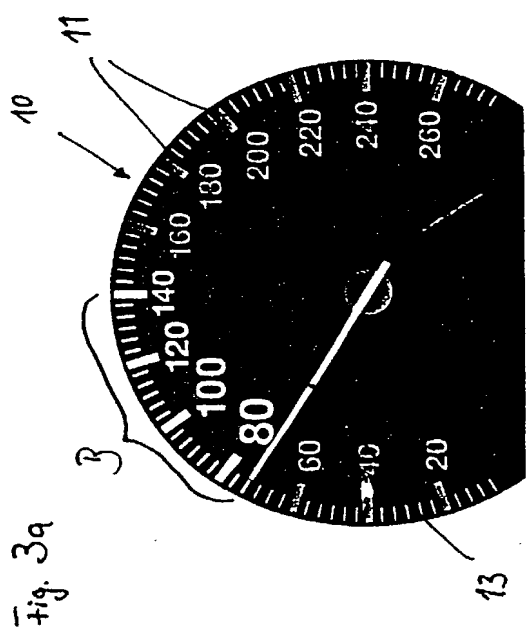
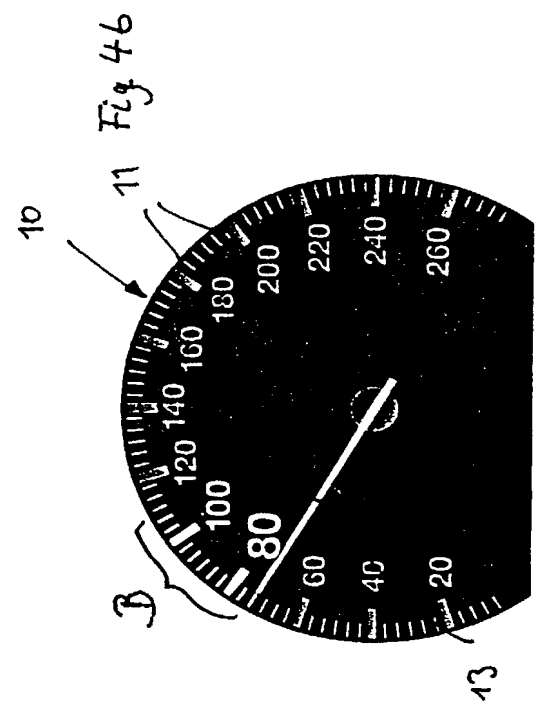
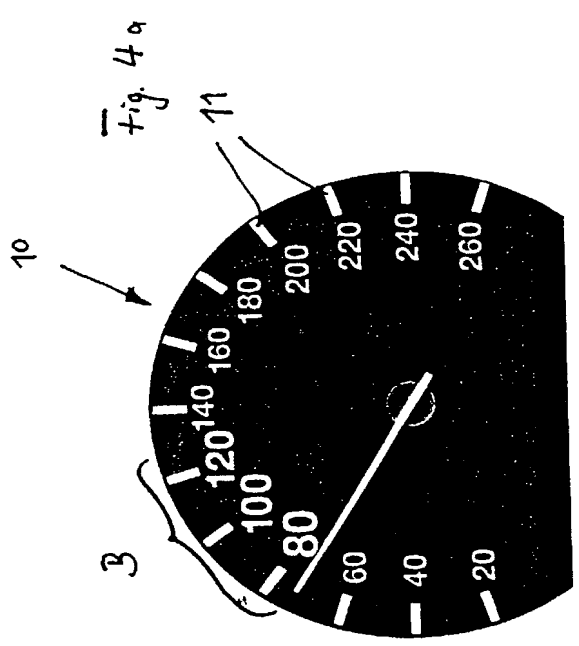


Fig. 2







Attorney Docket No. 951/50921

## DECLARATION AND POWER OF ATTORNEY

(For Use with Application Data Sheet)

As the below named inventor(s), I/we declare that:

**This declaration is directed to:**

X The attached application, or  
International Application No. PCT/EP00/08316, filed on 26 August 2000,  
as amended on \_\_\_\_\_ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR 1.56, including material information which became available between the filing date of the prior application and the National or PCT International filing date of the continuation-in-part application, if applicable;

I/we hereby appoint the practitioners at **CROWELL & MORING L.L.P.**, whose Customer Number is:



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as my/our attorneys to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith; and

All statements made herein of my/our own knowledge are true; all statements made herein on information and belief are believed to be true, and further these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

FULL NAME(S) of INVENTOR(S)

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Additional Inventors on Attached sheet if checked

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All statements made herein of my/our own knowledge are true; all statements made herein on information and belief are believed to be true, and further these statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001, and may jeopardize the validity of the application or any patent issuing thereon.

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As the below named inventor(s), I/we declare that:

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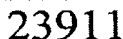
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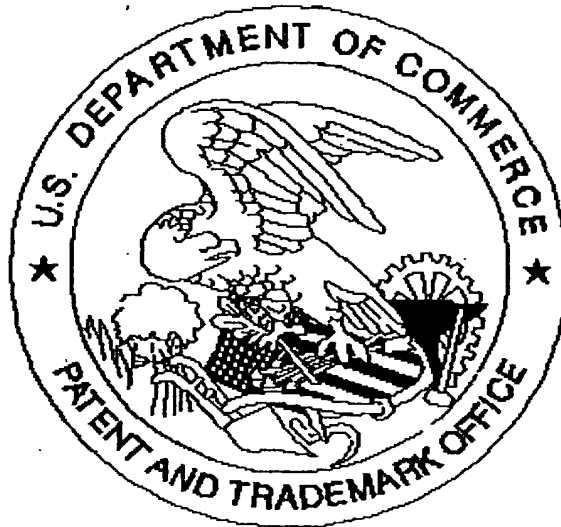
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Date: 17.03.08

Additional Inventors on Attached sheet if checked

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